Lunar Surface Science Virtual Workshop

May 28–29, 2020

Program and Abstracts

All times are Eastern Daylight Time (EDT) (UTC -4)

Thursday, May 28, 2020

Times	Authors (*Denotes Presenter)	Abstract Title and Summary
12:00 p.m.	Jake Bleacher * Ben Bussey *	*Welcome*
12:05 p.m.	Steve Clarke *	*SMD Overview*
12:25 p.m.	Marshall Smith *	*HEOMD Overview*
12:45 p.m.	Niki Werkheiser *	*STMD Overview*
1:05 p.m.	Lindsay Aitchison *	*Expected Exploration Capabilities for the Early Artemis Missions*
1:20 p.m.	Sarah Noble *	*Future Science Opportunities*
1:35 p.m.	Jake Bleacher * Ben Bussey *	*Artemis Science Goals and Strategy*
1:55 p.m.	DISCUSSION	
2:10 p.m.	James Carpenter *	*ESA Overview*
2:25 p.m.	Masaki Fujimoto *	*JAXA Overview*
2:40 p.m.	Martin Bergeron *	*CSA Overview*
2:55 p.m.	Samuel Lawrence *	*The Value of a Foothold on the Moon*
3:10 p.m.	Amy Fagan *	*LEAG Lunar Exploration Roadmap*
3:25 p.m.	Clive Neal *	*Science at the South Pole of the Moon*
3:40 p.m.	Heidi Hammel *	*Astrophysics and the Moon*
3:55 p.m.	Harlan Spence *	*Space Weather*
4:10 p.m.	DISCUSSION	
4:40 p.m.	Jim Green *	*Closing Remarks*

Friday, May 29, 2020

Times	Authors (*Denotes Presenter)	Abstract Title and Summary
12:00 p.m.	Young * Aitchison L. *	*Introduction, Welcoming Remarks, Technical Challenges Window*
12:05 p.m.	George *	*EVA Compatibility Requirements*
12:15 p.m.	Kanelakos *	*xEVA Hardware in Operational Scenarios*
12:25 p.m.	Naids A. J. * Bergman H. R. Hood A. D. Walker M. L. Graff T. G. Mitchell J. L. Young K. E. George T.	*Developing Initial Geology Sampling Tools for the Artemis Program* **[#5006]** The Extravehicular Activity (EVA) Tools Team at the Johnson Space Center (JSC) has started developing an initial set of next-generation lunar geology sampling tools for the Artemis Program.
12:35 p.m.	DISCUSSION	*Questions for first three speakers and general discussion*
12:45 p.m.	Stevenin	*ESA Lunar Surface EVA Tools*
12:50 p.m.	Bessone	*ESA Tools for Geological Planetary Operations*
12:55 p.m.	Zacny K. * Paulsen G. Indyk S. Chu P. Mank Z.	*Astronaut Deployable Sampling, Drilling, and Geotechnical Tools* **[#5086]** Here we describe several options for collecting samples on the Moon.
1:00 p.m.	Rehmatullah F. * Shariff J. A. Osinski G. R.	*Moon Caddy: A Lunar Geologist's Robotic Assistant* **[#5043]** This paper presents a mission architecture combining a human explorer with a roving robotic assistant. An astronaut geologist can make informed decisions about the target while an accompanying rover provides a suite of scientific instruments.

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1:05 p.m.	Hurtado J. M. Jr. *	*Modern Imaging Technologies to Support Geologic Field Work and EVA Operations on the Lunar Surface* **[#5130]** Lunar EVA activities can be documented at multiple scales and from multiple perspectives by collecting imagery to temporally reconstruct EVA events and to spatially reconstruct the study site in 3D, in so doing capturing vital context data.
1:10 p.m.	Blewett D. T. * Hibbitts C. A. Boldt J.	*A Simple Camera with Spectral Response Tailored for Lunar Rock and Soil Discrimination: A Tool for Astronauts and Robots* **[#5008]** A low-cost, COTS-based multispectral framing camera with wavelengths selected especially for study of lunar rocks and soils will provide a major increase in the science return compared to traditional RGB cameras.
1:15 p.m.	DISCUSSION	*Questions for last six speakers*
1:20 p.m.	Evans M. E. * Graham L. D. Feist B. F. Garry W. B.	*The Artemis "Gandalf's Staff" Science Suite for Crew EVA Lunar Field Geology* **[#5031]** Gandalf's Staff enhances EVA science for Artemis surface missions by providing illumination and precise documentation of geologic sample location, orientation, and collection conditions, then rendering a full 3D traverse model for playback analysis.
1:25 p.m.	Clark P. E. * Staehle R. Bugby D. Fraeman A. Green R. O. Sellar R. G. Madzunkov S. Maiwald F. Yu N. Tang A. Cochrane C. Hardgrove C. Collier M. Angelopoulos V.	*Handheld, Surface-Deployed, or Rover-Mounted Astronaut Instruments* **[#5050]** We are developing a diverse set of compact instruments, and high performance generic yet reconfigurable packaging suitable for these instruments, utilizable by astronauts as handheld, crew-deployed or rover-mounted devices on the lunar surface.
1:35 p.m.	Zanetti M. * Robinson B. Anzalone E. De Leon Santiago B. Hayward E. Steiner B. Anderton B. Cordova T. Jetton J. Langford D. Reeves J. Walters J.	*The Kinematic Navigation and Cartography Knapsack (KNaCK) LiDAR System* **[#5110]** The lunar SP is a challenging GPS-denied environment with difficult solar illumination conditions. We describe the development and testing of our velocity-sensing LiDAR instrument for terrain mapping and navigation to enable science and exploration.
1:40 p.m.	Honniball C. I. * Young K. E. Rogers A. D. Lucey P. G. Piquero D. Wolfe B. Glotch T. D.	*Rover-Based Reconnaissance with an Infrared Spectral Mapper and Real-Time Data Processing* **[#5079]** Spectral imaging on the surface of planetary bodies allows for faster definition of units in a quantitative manor in terms of relevant compositions. A rover-based imager can provide maps prior to EVA to inform sample triage and traverse execution.
1:45 p.m.	Núñez J. I. * Klima R. L. Murchie S. L. Warriner H. E. Boldt J. D. Lehtonen S. J. Maas B. J. Greenberg J. M. Anderson K. L. Palmer T. W. McFarland E. L.	*Enabling Surface Exploration and High-Grading of Lunar Samples with the Advanced Multispectral Infrared Microimager (AMIM)* **[#5149]** AMIM combines microscopic imaging with microspectroscopy to provide grain-scale mapping of minerals and ices of rocks and soils for human exploration and resource prospecting. AMIM enables the high-grading of lunar samples for future return to Earth.
1:50 p.m.	Shaw A. * Gellert R. Hiemstra D. Aslam I. Buckland D. Dickinson C. Fulford P. McCraig M. Schmidt M.	*Artemis-Enabled Lunar Elemental Abundance APXS Investigation* **[#5015]** The Artemis Program gives the lunar exploration community an opportunity to gain tremendous information about lunar surface composition. Using APXS to determine elemental abundance and its variations with geologic context is important.
1:55 p.m.	DISCUSSION	*Questions for last six speakers*
2:00 p.m.	BREAK	

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2:15 p.m.	Cannon K. M. * Mueller R. P. Deutsch A. N. Van Susante P. Tarnas J. D. Colaprete A. C. Sowers G. Dreyer C. B. Li S. Sercel J. Dove A. R. Britt D. T.	*The Snow Badger Mission Concept: Trenching for Ice with Humans and Robots* **[#5108]** Snow Badger is a proposed investigation where Artemis astronauts work together with autonomous RASSOR excavation robots to dig trenches near the Artemis landing site to study water ice and other volatiles.
2:20 p.m.	Kring D. A. * Heggy E.	*Conducting Subsurface Surveys with a Crew Rover to Address Both Scientific and ISRU Objectives* **[#5038]** Standard integration of GPR and NSS on crew rovers will provide the capability to survey the subsurface during transects across the lunar surface.
2:25 p.m.	Nagihara S. * Zacny K. Grott M.	*Astronaut-Deployed Heat Flow Probe for Measurements in the Lunar South Polar Region* **[#5013]** We propose a new design for an astronaut-deployed heat flow probe based on the lessons learned from the Apollo missions.
2:30 p.m.	Carroll K. A. *	*Lunar Surface Gravimetry Vis-a-Vis Artemis* **[#5151]** During Apollo, the Traverse Gravimeter Experiment was used to survey around the Apollo 17 landing site, discovering that region's geological structure. A modern gravimeter can be carried on Artemis landers and rovers, to make similar discoveries.
2:35 p.m.	Richardson J. A. * Bell E. Schmerr N. C. Espley J. R. Sheppard D. A. Connor C. B. Whelley P. L. Strauss B. E. Young K. E.	*Magnetic Surveys to Probe the Lunar Subsurface* **[#5133]** Magnetic surveys at the lunar surface can help prospect for resources and improve models of the lunar dynamo. We demonstrate this with field studies of lava flows and tubes on Earth.
2:40 p.m.	DISCUSSION	*Questions for last five speakers*
2:45 p.m.	Raimalwala K. R. Faragalli M. Reid J. E. * Smal E. P. Battler M. M.	*Autonomous Soil Assessment System: Contextualizing Rocks, Anomalies, and Terrains in Exploratory Robotic Science (ASAS-CRATERS)* **[#5124]** ASAS-CRATERS is a multi-mission technology that enables automated geologic scene characterization on planetary rover missions. It uses a deep-learning based terrain classifier and novelty detector, and aggregates data to support science operations.
2:50 p.m.	Eubanks T. M. * Radley C. F. Blase W. P.	*Using Long Wave Radio and the Lunar Plasma Environment for Lunar Exploration* **[#5167]** Here we describe how important communication and science problems can be addressed at the Moon through the use of low frequency radio at frequencies from 1 Hz to 100 MHz.
2:55 p.m.	Gershman D. * Sarantos M. Collinson G. Zesta E. Sittler E. Collier M.	*A Plasma Suite for the Lunar Surface* **[#5054]** We present a plasma suite intended to be deployed on the lunar surface to: (1) characterize the charging of the lunar surface, (2) characterize the near-surface plasma environment, and (3) study the interaction of the solar wind with lunar regolith.
3:00 p.m.	Gabriel T.-S.-J. * Hardgrove C. Jun I. Litvak M.	*Nuclear Spectroscopy for Geochemical Assay in Human Exploration of the Lunar Surface and Poles* **[#5157]** Nuclear spectroscopy at the lunar surface not only answers open questions in lunar science, but is ideal for volatile resource assessment and providing ground-truth to regional maps. Their operational requirements for human exploration are discussed.
3:05 p.m.	DISCUSSION	Questions for last four speakers

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3:10 p.m.	Staehle R. L. * Sellar R. G. Clark P. E. Hardgrove C. Tang A. Gim Y. Hayne P. Feldman S.	*Lunar Volatiles Integrated Survey Packages* **[#5032]** Will Artemis astronauts pass over or near scientifically revealing or resource-relevant volatile deposits? To find out, we propose three integrated instrument packages to perform a surface/subsurface volatiles survey accompanying Artemis crews.
3:15 p.m.	Wurz P. * Riedo A. Tulej M. Grimaudo V. Thomas N.	*Investigation of the Surface Composition by Laser Ablation/Ionisation Mass Spectrometry* **[#5061]** We present a Laser Ablation Ionization Mass Spectrometer that is compact, portable, features simple operation, for in situ resource utilisation by providing chemical analysis of solids. It consists of a TOF analyser, a fs-laser, and a microscope.
3:20 p.m.	Wilhelm M. B. * Ricco A. J. Chin M. Eigenbrode J. L. Jahnke L. Furlong P. M. Buckner D. K. Chinn T. Sridhar K. McClure T. Boone T. Radosevich L. Rademacher A. Hoac T. Anderson M. Getty S. Southard A. Williams R. Li X. Smith T. Podlaha O. van Winden J.	*ExCALiBR: An Instrument for Uncovering the Origin of the Moon's Organics* **[#5116]** We are developing ExCALiBR, an autonomous, miniaturized fluidic system, integrating lab techniques for lipid analysis. This system will enable future organic surveys on future NASA missions to the Moon, Mars, and Icy Worlds.
3:25 p.m.	Viswanathan V. * Mazarico E. Cremons D. R. Merkowitz S. Sun X. Smith D. E.	*Scientific Exploration of the Lunar South Pole with Retro-Reflectors* **[#5070]** Retro-reflector arrays placed on the Moon demonstrated their interdisciplinary scientific impact through the ongoing LLR experiment. NASA's CLPS and Artemis programs to the south pole provide a unique scientific opportunity to build on this legacy.
3:30 p.m.	DISCUSSION	*Questions for last four speakers*
3:35 p.m.	BREAK	
3:50 p.m.	Young * Aitchison L. *	*Introduction of Breakouts and Discussion of Deliverables*
3:55 p.m.	BREAKOUTS	*Breakout #1: Instrument Conops; Breakout #2: Questions/Comments from Science Community to EVA Community*
4:40 p.m.	Young * Aitchison L. *	*Breakouts Outbrief and Wrap-Up Discussion*
4:45 p.m.	ADJOURN	